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Original article

OUTCOME OF THERAPEUTIC KERATOPLASTY IN NON HEALING CORNEAL ULCER.

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Abstract

Background :

In developing nations like India, corneal blindness has been a major cause of visual impairment. Primarily, corneal ulcer is the primary cause of monocular blindness. Considering the prevalence of the condition, there have been surprisingly few studies and publications on corneal ulcers and their management. With the introduction of therapeutic penetrating keratoplasty (TPK), however, the incidence and prevalence of corneal blindness can be diminished. In order to determine the significance of therapeutic penetrating keratoplasty in cases of non-healing infected and perforated corneal ulcers, this study was conducted.

Aim:

The objectives were to evaluate the clinical outcome of a perforated and non-healing corneal ulcer, the reduction of symptoms and indicators of infection, the anatomical or structural integrity of the globe, and the visual outcome of therapeutic penetrating keratoplasty.

Methods :

Data were obtained from 74 patients who underwent therapeutic penetrating keratoplasty at our institution. Patients with a follow-up period of less than one year, paediatric cases, and PL-negative cases were excluded. The outcome was evaluated based on the maintenance of structural integrity, reduction in infectious burden, improvement in visual acuity, and graft survival, as well as its correlation with corneal vascularisation, previously failed grafts, donor tissue quality, graft size, and surgery type.

Results :

From a total of 74 cases, 47 (63.51%) were male. The majority of the patients were farm labourers. In our study, refractory corneal ulcer treated with Hypopion was the most prevalent indication for TPK.

Conclusion:

In the case of non-healing and perforated corneal ulcers, the study demonstrated that therapeutic penetrating keratoplasty has a favourable prognosis for reducing infectious burden and maintaining structural integrity, without which the eye could have been lost.

Keywords: Outcome of Therapeutic, Non Healing Corneal Ulcer, Keratoplasty,
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1. Introduction:

Visual impairment has been a significant public health concern in India since its attainment of independence. In order to address this issue,

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the government implemented the National Programme for Control of Blindness in 1976, a fully centralised initiative aimed at reducing the prevalence of blindness to 0.3% [1].

The primary aetiologies of visual impairment include cataractogenesis, refractive anomalies, glaucomatous neuropathy, and posterior segment pathologies. These conditions constitute approximately 99% of cases of visual impairment, with 0.99% of cases attributed to corneal blindness. In addition to cataract and refractive errors, corneal blindness represents a significant aetiology of visual impairment in developing nations [2]. The prevalence of this condition is contingent upon various factors, including geographic location and access to healthcare services [1]. The occurrence of corneal ulceration in developing nations has a significant impact on morbidity and has been referred to as a covert epidemic in medical literature [2]. Research conducted by Gonzales in the Madurai district of India revealed a significantly higher prevalence of corneal ulcer, with a 10-11 fold increase in incidence as compared to Olmsted County in the United States [3]. The aggregate incidence of corneal ulcers within the aforementioned region amounted to 850000 annually, representing a thirty-fold increase relative to the corresponding figure in the United States [3]. Upon examining the incidence of corneal ulcers in India, Asia, and Africa, the aggregate number surpasses 2 million. Ultimately, a majority of cases culminate in corneal blindness or more severe outcomes such as endophthalmitis and phthisis bulbi.

Bacterial keratitis is a prevalent aetiology of infective keratitis and a frequent instigator of corneal perforation. In cases where the perforations exceed the capacity of tissue adhesives or glues to seal, keratoplasty is deemed necessary [4]. Keratoplasty is a surgical procedure that involves the replacement of a diseased corneal tissue with donor corneal tissue either in its entirety (penetrating) or in part (lamellar). This procedure is commonly referred to as corneal transplantation in layman's terms. There exist three distinct categories of transplants, namely therapeutic, tectonic or reconstructive, and optical, each with its unique clinical significance and therapeutic applications [5].

Our objective was to conduct a comprehensive investigation of therapeutic penetrating keratoplasty, encompassing indications, preoperative evaluation, preoperative infectious burden, surgical methodologies, postoperative care, complications, postoperative reduction of infectious burden, and postoperative structural and visual outcomes. This medical intervention is performed with the aim of eradicating the infection and reinstating the integrity of the ocular globe, while achieving optimal visual rehabilitation. The research was conducted on a cohort of individuals who presented with non-healing and perforated corneal ulcers and sought treatment at the Ophthalmology Department of MKCG Medical College Hospital.

2. Materials and Methods:

In this retrospective interventional study analytic study, 74 patients who had undergone therapeutic PK for infectious keratitis that had not resolved despite optimal antimicrobial therapy were reviewed. The patient's age, gender, duration, type of infection, history of ocular trauma, and vision at presentation were obtained from the medical record. This research was performed between January 2021 and January 2023. The method of purposive sampling was utilised for this study. Our hospital's research and ethics committee approved this investigation. Each participant's assent was obtained in writing and with their knowledge.

2.1. Inclusion criteria:

All patients undergoing therapeutic penetrating keratoplasty for non-healing ulcer, impending perforation and perforated corneal ulcer.

2.2. Exclusion criteria:

Non-healing corneal ulcer with endophthalmitis and PL negative individuals.

2.3. Statistical Analysis:

Statistical analysis included descriptive statistics, inferential statistics, chi-square test and Cramer's V test. SPSS software version 16.0 was used.

3. Results:

Of the 74 patients, 47 (63.51%) were males and 27 (36.49%) were females. 14 patients (54.05%) were < 40 years of age, 28 patients (37.84%) were in 41 - 50 years of age and 23 patients (31.08%) in 51 - 60 years of age and 9 patients (12.16%) were more than 60 years of age (Table 1).

Bacterial microbes were found in 30 patients (40.54%) while fungal microbes were found in 22 patients (29.73%). Both bacterial and fungal microbes were found in 12 patients (16.22%), however, no microbe was found in 10 patients (13.51%) (Table 2).

This study found that 22 patients (29.73%) showed indications of refractory corneal ulcer with hypopyon. 18 patients (24.32%) showed indications of perforated corneal ulcer while 34 patients (45.95%) showed corneal abscess indication (Table 3).

In case of surgery, 66 patients (89.19%) underwent simple PK surgery, while 8 patients (10.81%) underwent triple procedure (Table 4).

Table 5 reveals that in maximum numbers of patients (62.16%) the predisposing factor was unknown. However, in 10 patients (13.51%) the risk factor was trauma, in 7 patients (9.46%) it was diabetes, in 6 patients (8.12%) it was chronic-dacryocystitis, and in 5 patients (6.76%) it was entopion.

Table 6 reveals that the total number of anatomical success was seen in 87.84% while anatomical failure was seen in 12.16%.

37 patients had clear lens; 15 patients had hazy lens while 12 patients had opaque lens. Among the infecting agents, the highest number of patients were seen in bacteria (30 patients) (Table 7).

Table 8 reveals the sizes of the graft at the end of 6 month. Highest numbers were seen in clear graft with 8.5 mm in graft size (27). The second highest was in clear graft with 8 mm graft size (10).

Table 9 reveals that success of therapeutical outcome was seen in 55 cases (74.32%) while failure was seen in 19 cases (25.68%).

4. Discussion:

The corneal transplant is the most frequently conducted allograft and also the most successful, with a high graft survival rate. According to the Australian corneal graft registry (ACGR), the long-term success rate decreases [6]. According to Indian studies, the graft survival rates are 79.6%, 68.7%, and 46.5% after 1, 2, and 5 years, respectively [7, 8]. Numerous factors, such as patient presentation, storage of transplant tissue, socioeconomic status, etc., distinguish eastern research from western research [9, 10]. In our study, only therapeutic penetrating keratoplasty was considered for 74 patients whose outcomes were evaluated after 2 years of follow-up. Patients in the study cohort ranged in age from 21 to 70 years, with 43.24 percent of patients falling between the ages of 50 and 70. Males comprised 63.51 percent of the population, while females made up 36.49 percent. Therefore, men over the age of 50 were more likely to develop a corneal ulcer.

Similar findings were obtained by Keshav BR et al. in their study [10]. All patients underwent a slit lamp examination of the anterior segment in accordance with the Jones guidelines. The observed findings included ulcer size, shape, and depth, infiltrate extent, hypopyon, scleral involvement, and corneal complications. Ultimately, grading was completed. Patients in the study group had a chronic, non-healing corneal ulcer, impending perforation, pseudocornea, or a perforated ulcer.

Corneal scrapings were performed and sent for evaluation of culture sensitivity. In our study, the most frequently isolated bacteria were staphylococci, and the most frequently isolated fungi were fusarium. In approximately 10 percent of cases, no growth was observed due to improper removal or contamination. At the time of presentation, 43.3% of the study population also had cataracts,

Table 1: **Age distribution**

Age group	**Frequency**
21-30	4
31-40	10
41 -50	28
51 -60	23
61-70	9

Table 2: **Microbiological study**

Microbes	**Frequency**
Bacterial	30
Fungal	22
Mix	12
No growth	10

Table 3: **Indications of TPK**

Therapeutic penetrating keratoplasty	**Frequency**
Refractory corneal ulcer with Hypopion	22
Perforated corneal ulcer	18
Corneal abscess	34

Table 4: **Types of surgery**

Surgical types	**Frequency**
Simple PK	66
Triple procedure	8

Table 5: **Predisposing factor**

Predisposing factor	**Frequency**
Chronic Dacryocystitis	6
Diabetes	7
Trauma	10
Entopion	5
Unknown	46

Table 6: **Anatomical success**

Total number	**Success**	**Failure**
74	65	9

Table 7: **Graft clarity with respect to causative agent**

Infecting agent	Clear	Hazy	Opaque
Fungus	12	5	6
Bacteria	20	6	4
Mixed	5	4	2

Table 8: **Effect of graft size at the end of 6 month**

Graft size in mm	Clear graft	Hazy graft	Opaque graft
8	10	2	4
8.5	27	5	4
9	8	5	5
>9	0	2	2

Table 9: **Therapeutic outcome of the surgery**

Total No of cases	Success	Failure
74	55	19

necessitating a triple procedure consisting of lens extraction, open sky vitrectomy, PCIOL implantation in the sulcus, and penetrating keratoplasty.

According to numerous studies [11-15], TPK is effective at preserving the structural integrity and stabilising the eye. Optically clear grafts were obtained in 50% of cases, significant turbidity in 20%, and opaque grafts in 16.22%. These findings align with the scientific literature. In one study by Nurozler, the final VA of 60 percent of perforated corneal diseases treated with clear grafts was 0.2 or superior [12]. In over 15 cases of suppurative corneal ulcer, according to a further study by Gong [13], the final VA was 0.005 or greater.

Other variables, including corneal periphery involvement, the presence or absence of PAS, graft size, and graft grading, were also correlated with the outcome. Even though none of these had a statistically significant p-value, our study demonstrates that corneal periphery involvement and the presence of PAS were associated with a greater number of opaque grafts. Since only A and B grade corneas were used in the procedure, there were no significant differences in the outcome. The outcomes of smaller grafts were superior to those of larger grafts.

5. Conclusion:

A corneal ulcer is a serious ocular emergency that, if treated promptly with adequate and appropriate antibiotics, can prevent vision loss. To initiate appropriate therapy, it is of the utmost importance to make a prompt diagnosis and to have a thorough understanding of the agents involved. Each case should be treated after the precise cause of the disease has been determined. Any patient with corneal trauma and patients with a history of contact lens use should be closely monitored and viewed with a high index of suspicion for infective keratitis and acanthamoeba keratitis due to the potentially devastating consequences of a delayed diagnosis.

In India, a tropical country where agriculture is the primary occupation, corneal infection is one of the most significant ophthalmic issues. They are common among elderly agricultural workers, who frequently suffer from debilitating conditions that make them susceptible to infection. They should be educated on the importance of eye protection at work and instructed to consult an ophthalmologist as soon as they sustain an eye injury. This could facilitate early treatment, thereby prevent-

ing vision loss.

Therapeutic keratoplasty plays a crucial role in restoring the anatomical integrity of the eye and visual rehabilitation in cases of perforated corneal ulcer. Therefore, TPK has been an essential procedure for preventing corneal blindness worldwide.

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